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2,400,716

CONTAINER

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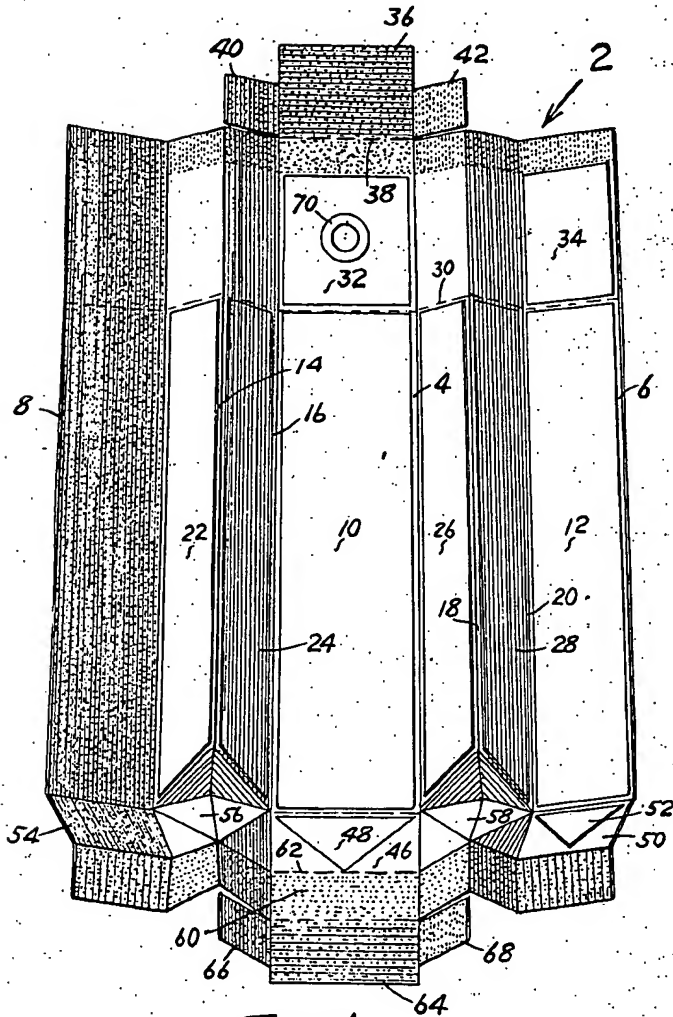


FIG. 1.

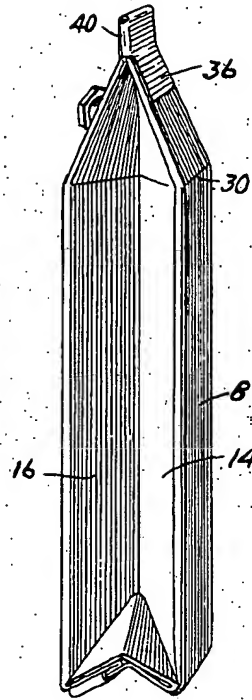


FIG. 2.

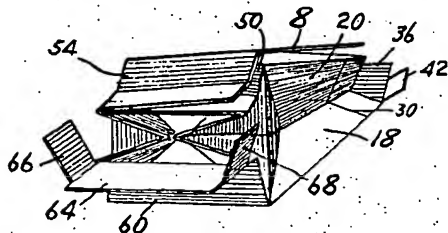


FIG. 3.

WITNESS:
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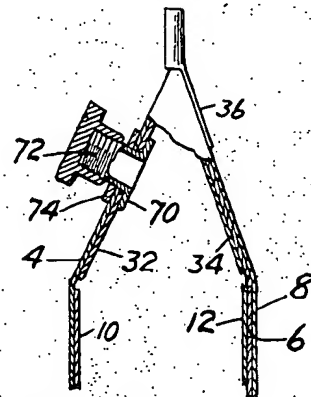


FIG. 4.

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CONTAINER

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5 Claims. (Cl. 222-107)

This invention relates to a container taking the form of a collapsible tube for plastic materials such as toothpaste, creams, paint or the like.

The object of the invention is the provision of a collapsible tube of the type indicated formed of paper or equivalent material, such as a woven fabric or the like, as contrasted with soft metal commonly in use heretofore. In accordance with the invention there is provided a tube of this sort offering initially a large volume for the reception of material and which can be collapsed for the extrusion of substantially its entire contents, the tube being completely sealed so that the material may escape only through an outlet opening.

The features of the invention will become apparent from the following description, read in conjunction with the accompanying drawing, in which:

Figure 1 is an interior perspective view of a blank from which the tube is constructed;

Figure 2 is a perspective view of the finished tube;

Figure 3 is a perspective view indicating the fashion in which the various folds of the tube are associated in closing the same; and

Figure 4 is a longitudinal section illustrating the outlet region of the tube.

While the tube may take various specific forms, there is illustrated in Figure 1 a blank 2 from which a preferred form of the tube may be made. This blank comprises a sheet of flexible paper having the characteristics pointed out hereafter. The sheet is formed into a series of areas separated by salient and reentrant corners, as will be evident from Figure 1, which shows the blank with the folds partially creased and from the finished tube in Figure 2. One side wall of the finished tube is formed by the area indicated at 4, while the opposite side wall is formed ultimately by the overlapping of the areas 6 and 8. Intermediate these are located the pairs of areas 14 and 16 at one side and 18 and 20 at the other. In order to give the final tube a definite shape, it is desirable to reinforce the areas 14, 16, 18 and 20 by means of reinforcing patches secured thereto at 22, 24, 26 and 28. It will be evident, however, that instead of adhering patches at these locations, the blank may be coated throughout the same areas with a heavy lacquer or the like providing a sufficient degree of stiffness. These areas terminate short of the fold lines so as not to interfere with the flexibility necessary to permit collapse as emptying takes place.

Above the level of these reinforced areas there

is provided a fold line 30 which, as will be evident from Figure 2, permits tapering at the upper end of the finished tube. Above these fold lines are further reinforcements 32 and 34 taking either the form of patches or stiffening coatings.

Integral with the upper end of the wall 4 is a tab 36 defined from the wall by a fold line 38 and carrying tabs 40 and 42 which serve to insure tight closure.

At the lower end of the wall 8 is a rectangular extension 54, while similar extensions 46 and 50 are provided at the lower ends of the walls 4 and 6. Between these and at the same level are regions 56 and 58 having folds as indicated, permitting the formation of reentrant portions, as will be evident in the final tube. Local reinforcements taking the form of patches or coating areas are provided at 48 and 52 on the regions 46 and 50. Below the various regions just mentioned, there is a fold line 46, and the regions are provided with lower extensions in the transverse region indicated at 60. At the lowermost end of the central area there is a tab 64 provided with auxiliary tabs 66 and 68.

Before assembly takes place, there is located through an opening in the upper portion of the wall 4, i. e., through the reinforcement 32, an outlet member 70, which may be adhered to the wall and is desirably reinforced exteriorly by disc 74. The outlet 70 and the disc are desirably formed of a plastic resin and securing may be effected by pressure tending to integrate to a greater or less extent these elements. The outlet 70 is threaded as indicated at 72 for the reception of a conventional closure cap.

The blank is provided with a suitable adhesive, indicated in the blank of Figure 1 by stippling.

Reference to Figure 3 will indicate the fashion in which the various folds are brought together to provide the closed tube illustrated in its final form in Figure 2. It will be noted from these figures that the lower tab 64 and the side tabs 66 and 68 tend to enclose the various lower elements of the blank. Similarly, the upper tab 36 and the auxiliary tabs 40 and 42 enclose the upper folds of the blank. To finish the tube, the assembly enclosed by the tab 64 and the auxiliary tabs 66 and 68 may be moved sidewise and adhered to the adjacent lower wall portion, i. e., 46.

The materials used for the formation of the tube are subject to considerable variation. For example, it has been found that heavy paper of reasonable flexibility may be used for the blank. The flexibility, however, need not be great, inasmuch as in ordinary use the folds are

flexed but once, passing through the condition which they assume when the tube is full to that assumed when the tube is empty and discarded.

In order to prevent penetration of the walls by the material within the tube, the tube is desirably lacquered internally through the use of a suitable flexible coating material, the composition of which will depend largely upon the material contained in the tube. For example, lacquers of the nitrocellulose or other cellulose ester type, suitably plasticized, may be used, or the lacquer may comprise various vinyl ester polymers such as the polymer of vinyl chloride. Such compositions are well known to the art, and it will be unnecessary to describe them in detail, particularly since they vary with the material packed.

As indicated above, the various interior reinforcements which tend to define and stiffen the walls may take the form of patches of pasteboard or paper adhered to the walls by any suitable adhesive and also lacquered interiorly. It is, in fact, preferable to provide the reinforcement and then lacquer the entire interior of the tube.

Following such lacquering, the adhesive is applied over the desired areas, while the blank is flat, whereupon folding may be accomplished by the use of conventional folding machines to bring the tube into its final condition. The adhesive used for this purpose is desirably of a type which is not dissolved or attacked by the contents of the tube and may, for example, take the form of a thermoplastic resin capable of being softened by the application of moderate heat which will not damage the other materials entering into the formation of the tube. For this purpose, the various conventional heat-sealing compositions may be used, comprising, for example, mixtures of waxes and resins or various thermoplastic resins of low softening point.

Alternatively, the tube may be formed of laminated papers, closely woven fabrics laminated with each other or with paper, or impregnated with non-penetrable fillers taking the form of semi-flexible compositions comprising synthetic plastics or the like.

The reinforcing areas may be provided by coatings of fairly stiff resins, additional plies of impregnated fabric or the like.

It will be evident that upon sealing as indicated, and particularly in the use of thermoplastic adhesive, all of the openings may be readily completely sealed against the possible escape of the semi-fluid contents of the tube. In the regions where leakage is most likely to occur, namely, at the lower and upper folds, the overlapping tabs serve to insure complete tightness.

In order to provide for the possibility of completely flattening the tube to extrude substantially all of its contents, it is advantageous to provide the opening at one side thereof as indicated. It will be evident, however, that the opening may be provided at the end as in conventional tubes, though in such case the necessity for providing a support for the opening will, in general, prevent complete collapse of the upper end of the tube, necessitating the presence of a certain minimum volumetric region from which the contents cannot be pressed.

Filling may be accomplished in various fashions, either through the outlet opening with expansion of the tube from a flattened to its full condition, or at some stage short of complete

closure while, for example, the folds at one end are either unsecured or only partially secured together.

It will be evident that the arrangement of the folds, reinforcements and the like, are subject to substantial variation, while adhering to the principles of the invention as defined by the following claims.

What I claim and desire to protect by Letters Patent is:

1. A collapsible tube of fibrous material comprising a pair of semi-rigid, approximately plane walls joined by reentrant side walls, each of the latter comprising a plurality of approximately plane walls joined to each other and to the first mentioned plane walls along well-defined fold lines, each of the plane walls forming the reentrant side walls being reinforced by rigid material arranged so that substantially no distortion of said walls will take place with the reinforcements terminating short of said fold lines so that the rigidity of the reinforcements does not interfere with collapse of the tube, and means providing an outlet for the contents of said tube.

2. A collapsible tube of fibrous material comprising a pair of semi-rigid, approximately plane walls joined by reentrant side walls, each of the latter comprising a plurality of approximately plane walls joined to each other and to the first mentioned plane walls along well-defined fold lines, each of the plane walls forming the reentrant side walls being reinforced by rigid material arranged so that substantially no distortion of said walls will take place with the reinforcements terminating short of said fold lines so that the rigidity of the reinforcements does not interfere with collapse of the tube, all of said walls being interiorly coated to prevent penetration thereof by semi-fluid contents, and means providing an outlet for the contents of said tube.

3. A collapsible tube of fibrous material comprising a pair of semi-rigid, approximately plane walls joined by reentrant side walls, each of the latter comprising a plurality of approximately plane walls joined to each other and to the first mentioned plane walls along well-defined fold lines, each of the plane walls forming the reentrant side walls being reinforced by rigid material arranged so that substantially no distortion of said walls will take place with the reinforcements terminating short of said fold lines so that the rigidity of the reinforcements does not interfere with collapse of the tube, said various walls being joined at their ends to provide a collapsible structure, the junction at one end being of reentrant type, and means providing an outlet for the contents of said tube at the other end thereof.

4. A collapsible tube of fibrous material comprising a pair of semi-rigid, approximately plane walls joined by reentrant side walls, each of the latter comprising a plurality of approximately plane walls joined to each other and to the first mentioned plane walls along well-defined fold lines, each of the plane walls forming the reentrant side walls being reinforced by rigid material arranged so that substantially no distortion of said walls will take place with the reinforcements terminating short of said fold lines so that the rigidity of the reinforcements does not interfere with collapse of the tube, said various walls being joined at their ends to provide a collapsible structure, the junction at one end being of reentrant type, and the junction at the other end being of tapering type, and means

providing an outlet for the contents of said tube at the last mentioned end.

5. A collapsible tube of fibrous material comprising a pair of semi-rigid, approximately plane walls joined by reentrant side walls, each of the latter comprising a plurality of approximately plane walls joined to each other and to the first mentioned plane walls along well-defined fold lines, each of the plane walls forming the reentrant side walls being reinforced by rigid material arranged so that substantially no distortion of said walls will take place with the rein-

forcements terminating short of said fold lines so that the rigidity of the reinforcements does not interfere with collapse of the tube, said various walls being joined at their ends to provide a collapsible structure, the junction at one end being of reentrant type and comprising a plurality of approximately plane portions joined along flexible fold lines to each other and to the several previously mentioned walls, and 10 means providing an outlet for the contents of said tube at the other end thereof.

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